

We claim:

1. A process for partial shaping of a flat glass or glass ceramic part, said process comprising the steps of:

a) placing a flat glass or glass ceramic article on a planar support with an entire facing surface of the flat glass or glass ceramic article resting fully on the planar support, said planar support having at least one through-going shaping opening in a shaping region;

b) producing a low pressure in a space below the planar support to hold the flat glass or glass ceramic article fixed on the planar support;

c) partially heating the flat glass or glass ceramic article in the vicinity of the shaping region on the planar support until at least a part of the flat glass or glass ceramic article softens;

d) providing at least one shaping die in the at least one through-going shaping opening in the planar support in an initial position below the flat glass or glass ceramic article on the planar support prior to the partial shaping;

e) raising the at least one shaping die provided in the at least one through-going shaping opening over a predetermined distance into said part of said glass or glass ceramic article that is softened in the partial heating of step c) at the same time as the producing of the low pressure in said space below the planar support;

f) then cooling a partially shaped glass or glass ceramic product formed from the glass or glass ceramic article by said heating, said low pressure and said raising of said at least one shaping die;

g) withdrawing the at least one shaping die from a solidified portion of the partially shaped glass or glass ceramic product; and

h) removing the partially shaped glass or glass ceramic product from the support plate.

2. The process as defined in claim 1, wherein said partially heating is performed by heating means comprising an IR radiation source or a gas burner.

3. The process as defined in claim 1 or 2, wherein said partially heating of the glass or glass ceramic article is performed until the glass or glass ceramic article has a viscosity below 10^6 dPa·s.

4. The process as defined in claim 1 or 2, wherein said partially heating takes place for a time interval of less than 30 s.

5. The process as defined in claim 1 or 2, wherein said cooling comprises blowing air on the partially shaped glass or glass ceramic product.

6. The process as defined in claim 1, wherein the removing comprises means for mechanically raising the partially shaped glass or glass ceramic product.

7. The process as defined in claim 6, wherein the means for mechanically raising comprises lifting members.

8. The process as defined in claim 1, wherein the removing comprises directing compressed air at the partially shaped glass or glass ceramic product to lift the glass or glass ceramic product from the support plate.

9. An apparatus for partial shaping of flat glass or glass ceramic parts, said apparatus comprising

a planar support plate for receiving and supporting a flat glass or glass ceramic article so that the flat glass or glass ceramic article rests with an entire surface thereof fully on said planar support plate, said planar support plate being arranged over a substantially airtight hollow compartment and having at least one through-going shaping opening to said substantially airtight hollow compartment;

at least one shaping die for said at least one through-going shaping opening, each of said at least one shaping die being received in a respective one of said at least one through-going shaping opening with a predetermined peripheral gap between said at least one shaping die and said planar support plate, so that said at least one shaping die is substantially flush with an upper surface of the planar support plate in an initial position and is movable upward from said initial position to extend to a predetermined displaced position above the upper surface of the planar support plate;

vacuum-producing means for producing a low pressure in the airtight compartment;

heating means for partially heating the glass or glass ceramic article in the vicinity of the at least one through-going shaping opening prior to performing the partial shaping; and

ejecting means for removing a finished glass or glass ceramic product from the planar support plate after the partial shaping.

10. The apparatus as defined in claim 9, wherein said planar support plate and said at least one shaping die are made from a heat-resistant metal.

11. The apparatus as defined in claim 9, wherein said planar support plate and said at least one shaping die are made from ceramic material.

12. The apparatus as defined in claim 9, further comprising at least one ram rigidly connected to said at least one shaping die and a vertically movable base plate provided in the hollow compartment, and wherein said at least one ram is fixed to said vertically movable base plate in the hollow compartment and has a predetermined length according to a predetermined height of a shaped region to be formed in the glass or glass ceramic article.

13. The apparatus as defined in claim 9, wherein the support plate has through-going holes or is made from a porous material to assist in providing a suction force on the glass or glass ceramic article resting on the support plate.

14. The apparatus as defined in claim 9 or 13, wherein the at least one shaping die is provided with through-going holes or is made from a porous material to assist in providing a suction force on the glass or glass ceramic article resting on the support plate.

15. The apparatus as defined in claim 9, wherein the ejecting means comprises mechanical means for raising the partially shaped glass or glass ceramic article from the support plate.

16. The apparatus as defined in claim 15, wherein the mechanical means comprising lifting members for lifting the partially shaped glass or glass ceramic article.